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APPENDIX II.

[Vide answer to starred question No. 460 asked by Sri K. R. Nallasivam (on behalf of Sri S. Pakkirisami Pillai) at the meeting of the Legislative Assembly held on 18th March 1960, page 6 supra.]

ENQUIRY INTO THE PREVALENCE OF BYSSINOSIS IN COTTON TEXTILE INDUSTRY IN SOUTH INDIA.

(Under Dr. T. S. Adisubramaniam, Municipal Health Officer, Madurai.)

Recommendations by the Committee.

Object.—To ascertain the extent of Byssinosis in the Cotton Textile Industry in South India.

Conclusion drawn.—(a) That Byssinosis is prevalent among the workers in the Madura Mills.

(b) That a large number of workers are allergic to cotton dust.

(c) That the assessment of the state of nutrition of the workers indicates a very poor percentage of good health and physical fitness.

Exact requirements.—One Senior Medical Research Officer, one Medical Assistant, one Medical Laboratory technician and one attendant. An allowance for contingencies and travelling. Instruments for dust counting, sling hygrometer and kata thermometer, stop watch.

NOTE ON THE WORK DONE ON THE ENQUIRY INTO THE PREVALENCE OF BYSSINOSIS IN SOUTH INDIA UNDER DR. T. S. ADISUBRAMANIAM UP TO THE END OF SEPTEMBER 1949.

This enquiry has been in progress for the last two months of August and September 1949. During this period of two months, 250 workers in the Madura Mills were clinically examined and the results of the investigation are submitted below.

The lines of work undertaken are—

- (1) Study of old records of sickness absenteeism.
- (2) Study of dust producing conditions in the various departments.
- (3) Clinical examination of the workers in the mixing, blowing and card room.
- (4) Study of blood picture of the workers.

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In this investigation four schedules have been put into operation and data are being collected for final analysis. These schedules relate to as follows :—

Schedule I.—Information regarding the individual worker.
Do. II.—Information regarding personal data, previous history, education, etc.
Do. III.—Information regarding the workers' opinion of his job.
Do. IV.—Information regarding the worker and his social and home environments.

1. Study of old records of sickness absenteeism for the years 1946, 1947 and 1948.—The sickness absenteeism statements of the Madura Mills due to diseases for the last three years (1946, 1947 and 1948) reveal that respiratory diseases have been steadily increasing, as the following table will indicate :—

	1946.	1947.	1948.
Total working staff workers	132,559	133,991	135,686
Total number of sickness treated ..	26,775	28,445	34,187
Total number of respiratory disease other than pneumonia and tuberculosis treated.	2,630	3,000	4,037
Percentage of total sickness to total working staff.	20.18	21.22	25.20
Percentage of respiratory disease to total number of sickness treated.	9.826	10.58	11.80
Percentage of respiratory disease to total working staff.	1.985	2.246	2.975

The various lung infectious are detailed below :—

Diseases.	Total number treated.		
Influenza	1,119	1,898	1,419
Pneumonia	110	86	55
Tuberculosis	29	16	16
Respiratory diseases* other than pneumonia and tuberculosis.	2,630	3,009	4,037
Total cases treated	26,775	28,445	34,187
Total accidents	721	722	714

* The data regarding the various kinds of respiratory diseases (grouped under this head) are not available.

The number of man-days lost and the cost of sickness absenteeism due to sickness are tabulated below :—

Number of man-days lost *	..	1946.			1947.			1948.		
		RS.	A.	P.	RS.	A.	P.	RS.	A.	P.
(a) Sick leave wages paid	..	50,835	13	0	54,901	15	6	62,821	12	6
(b) Hospitalization costs	..	3,890	1	0	7,790	6	9	9,384	8	3
Total costs (a) and (b)	..	54,725	14	0	62,692	6	3	72,216	4	9
Total accidents compensation paid.	6,050	6	9	5,638	8	3	6,976	7	6	

* One "Man-day" means eight working hours per day.

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2. Study of dust producing conditions in the Madura Mills.—The first process the raw cotton undergoes is the mixing of one staple with another. Much dust and dirt is disengaged in this operation. The respiration is affected from the dust irritating the respiratory passages. The arms and hands show dry skin, and often a goose-skin appearance. In two cases (dry) eczema has been observed. After passing through the openers and scutchers, the strippers, grinders and card-hoppers, the cotton passes through the openers and scutchers. The strippers, grinders and card-room workers are engaged in the next process of cotton yarn production. They often suffer from dry cough, sorethroat, and with occasional tightness of chest. The next place, where the cotton comes to, is the drawing and roving rooms. The ring frames are the next, where the cotton assumes the cotton thread form. High temperature is present here, for two reasons, viz :—

- (i) the machines are working at high-speed ; and
- (ii) the machines are situated in the ground floor, with not good ventilation.

The next process is the packing one, where there is little dust. Workers look very healthy here.

Within the mills, the dust is disturbed by the following factors, viz. :—

- (i) Moving bales on the road, from the stock piles-sand and cotton dust.
- (ii) Throwing bales on the road with a thud after transporting them.
- (iii) Breaking the bales in the mixing room-coarse and fine cotton dust, as well as sand dust.
- (iv) Feeding the hoopers by hand-coarse cotton fibres set afloat.
- (v) In the stock-bins for collecting cotton from the crigthon openers-coarse cotton fibres float freely here. Thread extractors operate here.
- (vi) (Hopper openers) fine dust float.
- (vii) at the scutchers, fine cotton dust float.
- (viii) In the card-room, fine cotton dust floats, giving a cloudy appearance to the whole area, in spite of them being cleaned by vacuum pump, thrice daily.
- (ix) At the willow machines, cotton, sand, and husk dusts are set afloat.
- (x) Due to the high-speed of the roving frames coarse sand fine cotton fibres fly off in very large numbers.
- (xi) House keeping by constant sweeping of the floors is a factor, in the disturbance of dust, which rises from the floor and irritates the nostrils and throat.

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From the high velocity of the machines in use, the quantity of short fibres of cotton set afloat in the mixing and blow rooms is very great indeed. The speed of the beater scutcher, and of the fan are as follows :—

	Speed of.				Revolutions per minute.
(i) Line shaft	..	—	300
(ii) Beater (for coarse counts)	1,000
(iii) Beater (for fine counts)	—	857
(iv) Finisher-beater (coarse counts)	—	857
(v) Finisher-beater (fine counts)	—	923
(vi) Fan-coarse counts	—	..	1,160
(vii) Fan-fine counts	—	—	..	—	996
(viii) Finisher fan (fine counts)	1,057
(ix) Finisher fan (coarse counts)	995

Dust control and removal.—Except in the “combing” section, there is no sprinkler installation. The rubber department is air-conditioned.

Lighter dusts are removed in the mixing and blow rooms by means of the exhaust fans, which take them to the gutter and flue. Cards are stripped by vacuum-stripping process, reducing the brush-stripping by hand to the minimum. This eliminates the floating cotton and metallic dusts, as far as possible. House keeping system is adopted, which removes the coarse cotton dust and waste.

3. Clinical examination of 250 workers in the mixing, blow and card rooms.—The workers engaged in the mixing and blow rooms were selected to ascertain the extent to which health is affected by the cotton fibres and dust, as these are the two dusty sections of the cotton yarn mill. Of the 250 workers, who have been examined 40 per cent show symptoms of respiratory affection, while the remaining 60 per cent are free from any respiratory disease.

The clinical diagnoses of 250 workers are as follows :—

	NUMBDR.		
Respiratory diseases	..	—	80
Heart diseases (high blood-pressure and V.D.H.).			15
Other diseases	15
With no symptoms	140
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Total	..	250	<hr/>
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The respiratory diseases from the point of view of cotton dust factor are classified in the table below :—

<i>Room.</i>		<i>Byssinosis.</i>	<i>Bronchitis.</i>	<i>Asthma.</i>	<i>Allergy.</i>	<i>Tuberculosis.</i>	<i>Total affected.</i>	<i>PER CENT.</i>	<i>NOS.</i>	<i>Total non-affected.</i>	<i>Total examined.</i>
Mixing	..	..	16	12	4	4	..	36 (30)	84 (70)	120	
Blow	..	..	8	4	..	4	4	20 (40)	28 (60)	48	
Card	..	..	..	..	4	4	..	8 (25)	24 (75)	38	
Strippers	..	..	..	18	18	..	16 (32)	34 (68)	50		
		Total	..	24	16	26	30	4	80 (32)	170 (68)	250

It may be pointed out that the strippers suffer most, while next come the blow room workers and then the mixing and card rooms workers in the descending order of frequency.

Symptoms of Byssinosis.—Even though the classical symptoms and signs of pucca cases of Byssinosis have not been detected, the observed signs and symptoms indicate the nature of disease.

After working for a few years (minimum 8 years in this Madura Mills) without any appreciable trouble or complaint, the worker develops dry cough and attacks of breathlessness with or without a feeling of tightness in the chest. The dry cough which at times is distressing (as it is accompanied by a feeling of tightness in the chest and breathlessness or tiresomeness) is relieved by going on sick leave for 2 to 3 days. On return to the working spot and after 3-4 days they exhibit the same above symptoms of cough and breathlessness. This is most frequently observed in the mixing and blow rooms. The workers have lost flesh and become tame both in face and body, even though they have not developed the typical facies byssinosis. Evidence for the Mill fever is slender and therefore not considered at present.

Cases on the border line between byssinosis, asthma, allergy, and eosinophil lungs have been noted but the numbers are not large enough to evaluate the data so far collected.

There are some workers who in the early months of their career in the Mills showed allergic reactions (sneezing, cold, cough with breathlessness) to cotton dusts; but subsequently have become immunised so to say, as they have been working without any complaint for the rest of their service. The service of the 250 workers (under review) ranges from 23 to 27 years.

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4. Study of the blood picture of the workers.—A systematic and routine examination of blood for total B.B.C. and W.B.C. counts, differential counts and Haemoglobin estimation have been carried out. The results are tabulated below:—

Total number examined.	Affected group.	Non-affected group.	Grand total.
(1)	(2)	(3)	(4)
	90	60	150

Average—

R.B.C. counts p. c. cm.	.. ..	2,788,750	3,815,000
Leucocyte	.. ..	8,533	5,591
Ratio of W.B.C. to R.B.C.	1 to 326.8	1 to 682.3

PER CENT. PER CENT.

Changes in R.B.C.—

Microcytic changes	75	..
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Differential count—

Polymorphos	61.6	73
Lymphocytes	24.4	15.0
Large Mononuclears	6.4	7.0
Eosinophils	7.6	5.0

Percentage of Haemoglobin*	55.0	80.0
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* Estimated by Sahli-Adams Haemometer.

The reduction in the number of R.B.Cs. and the Haemoglobin percentage with marked microcytic changes point to a high rate of anaemia among the affected workers. The other set of 60 non-affected workers, who are also working at the same spot in the mixing and blow rooms also show a reduction of R.B.Cs. but without any changes in the R.B.Cs.

The high percentage of eosinophilicells in both sets of workers reveal that inhalation of cotton dust over a long period tends to produce eosinophilia.

Further study is required to confirm this blood picture to correlate the data of changes in the blood picture.

The assessment of the stage of nutrition among this group of 150 workers shows that the sub-nutritional group is highest.

		Affected group.	Non-affected group.
Excellent	7 15
Normal	—	25 30
Sub-normal	43 10
Bad	15 5
Total	—	90	60

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This assessment of the state of nutrition has been made according to the recommendations of the Board of Education, England, as applied to school children. From careful observations, it may be pointed out that the poor state of health is due to (i) bad food habits and (ii) economic conditions, where the workers with a large family is unable to feed himself properly. Data regarding nutritional survey are being collected.

A general survey of social and environmental conditions have been carried out. This survey reveals that most of the workers are indebted, as they are not able to meet their family budgets within their average income of Rs. 74 per mensem. The high cost of living index is one of the main reasons for this state of affairs. As the quantity of rationed rice is not enough, rice in the black-market is bought at a high price.

For lack of the necessary instruments, dust counts and meteorological reading, could not be carried out at present. Arrangements are being made to take skiagrams of affected workers, to aid the clinical diagnosis. Biological investigations could not be carried out for lack of facilities. The results of these proposed experiments will be reported later on.

Future line of work.—It is proposed to continue the enquiry during the next year and complete the year's observations in the textile industry in South India. Examination of the members of the families of the affected workers will be taken up very soon.

It is proposed to carry out the dust counts as soon as the dust counter is available; and also to carry out biological investigations by preparing extracts of the cotton seeds and having skin tests conducted on the workers and experimental animals.

It is also programmed to continue the study in other cotton textile mills in other parts of South India so that eventually the actual prevalence of byssinosis in the different cotton textile industries in the whole of South India and their influence on industrial health can be brought out.

